MONTHLY WEATHER REVIEW,

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WAR DEPARTMENT,

Office of the Chief Signal Officer,

DIVISION OF

TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

INTRODUCTION.

In the preparation of this general review of the meteorological conditions which obtained in the United States and adjoining territories during the past month, meteorological reports from the following sources have been recorded and carefully examined at this office: Signal Service, U. S. A., 96 stations; United States Army post surgeons, forwarded by the Surgeon General, 39; Canadian meteorological service, 13; regular volunteer observers, 251; these latter reports have been particularly valuable in the preparation of the accompanying Rain Chart. In addition to the above, marine reports have been received, which have served to determine the course and extent of storms beyond the region of permanent stations. The most noticeable meteorological features of the month are—

First. The violent cyclone, which passed to the westward over the West Indies, and thence to the coast of Texas, causing great loss of life and destruction of property, and furnishing one of the most perfect types of a tropical storm originating in the lower latitudes, and passing into the region of the temperate zone, the centre of disturbance describing approximately a parabola, the axis of which may be said to coincide with the northern limit of the trade-winds, and the vertex or most westerly portion of the curve being located near Galveston. This storm is referred to in the text under the head of Low Barometers, and is marked as No. III on the chart of storm tracks.

Second. The low mean temperature of the month, which has averaged from one to four degrees below the mean in the several districts. This variation, though apparently slight, gives to the month its appreciable low temperature, a condition particularly unfavorable to the agricultural interests of those sections of the country requiring warm, dry weather for the maturing of the unusually late crops. Very early frosts have injured fruit and late corn in the Northwest, and sections of the Middle and New England States.

Third. The drouths which prevailed in sections of the Southern States, have been followed by heavy rains in the regions of the Gulf States and lower Mississippi valley, but dry and warm weather has continued in the southern portion of the South Atlantic States, and in the northern portion of Texas.

Fourth. The violent local storms which have occurred, especially in New Mexico and Colorado, and on the eastern slope of the Rocky mountains.

ATMOSPHERIC PRESSURE.

From an examination of Chart No. II, it will be seen that the area of high barometer now extends over the southern portion of the United States, from the south Atlantic coast westward to the lower Mississippi valley; and that the area of mean low barometer is in

the region of the lower St. Lawrence valley. A comparison with the corresponding chart of the July REVIEW, shows a rapid increase of pressure in the Mississippi valley and the Northwest, and that the area of mean low barometer has moved toward the Atlantic with unusual rapidity.

(1.) *Areas of High Barometer.*—These areas, observed within the limits of the United States during the month, approached from the northern and interior portion of the continent, moving toward the Atlantic with uniform progression in the interior, but with an apparent retardation after the centre had passed to the east of the coast-line. They have been accompanied by a depression of temperature ranging from five to twenty-five degrees below the mean, depending upon the latitude of the station.

No. I. This area is of particular interest, as its origin is distinctly marked within the limits of the United States. It was first enclosed by an isobarometric line of 30.10, which included the regions north of Tennessee and Virginia. During the 7th and 8th the barometer rose at the stations on the Atlantic coast, and the shifting of the winds to the east and south indicated that this area continued its southeasterly course.

No. II. The telegraphic reports received on the morning of September 9, indicated the advance of this area toward the Lake region from British America. It followed immediately depression No. II, accompanied by rain, and brisk and high northerly winds from the Missouri valley eastward over the Lake region. Heavy gales occurred in its southeast quadrant on Lakes Michigan, Erie and Huron, and in the St. Lawrence valley, causing loss of life and serious marine disasters. The path of the centre of this area lies to the north of the Lake region, and thence over the northern portion of the Middle States to the Atlantic. Its southern half, therefore, extended over the entire country east of the Rocky mountains, southward to the Gulf, and the cool weather which was experienced on the Atlantic coast between the 10th and 15th, occurred while these districts were in the western quadrants of this area.

No. III. A slight area of high barometer which moved from the Northwest over the Lake region between the 14th and 18th but not reaching the Atlantic coast and apparently disappearing under the influence of the cyclone. Frosts proving injurious to late crops occurred in Minnesota, Michigan, Wisconsin and the northern portions of Illinois and Iowa whilst this area was central in the Northwest.

No. IV passed from British America southeastward to the South Atlantic, extending over the entire country, causing the barometer to rise from two to four-tenths above the mean in all the districts. Clear, cool weather prevailed generally from the 20th to the 24th, and frosts occurred in the northern districts.

(2.) *Areas of Low Barometer.*—The number of barometric depressions traced from the tri-daily reports received at this office during the month is, as in the two preceding months, less than in the corresponding months of previous years.

Chart No. I shows the track of each depression as determined from the consecutive reports after the definite progressive movement had commenced. Compared with those of the previous month the tracks in the northern portion of the country have a lower mean latitude and a general direction more directly to the east, passing to the Atlantic in the region of the St. Lawrence valley.

The disturbances in the southern portion of the United States have been unusually severe, and resulted from storms which originated beyond the limits of the stations of observation. The records of previous years show that the most violent storms occurring in the United States have their origin in the Tropics, and that before reaching our stations they have a westerly movement.

No. I. First observed latitude 43° 30′, longitude 22° west from Washington; last observed latitude 48°, longitude 16° east of Washington; time of transit, 72 hours; hourly velocity, 23½ miles Reports received during September 1st, indicated the approach of this depression, but the centre was not located on the tri-daily weather maps until the afternoon of the 2nd, and then only approximately in the upper Missouri valley, near the eastern boundary of Dakota. The above-mentioned report indicated heavy rains in Minnesota, and light rains in the Upper Lake region; the barometer at Bismarck reading 29.63, and at Yankton, 29.66. The rain-belt, attending this depression, extended from the Missouri valley eastward over the northern portion of New England and the Middle States and St. Lawrence valley during the 2nd, 3rd, 4th and 5th. As the storm approached the Atlantic coast, the gradient increased, and the winds became dangerous to shipping in the Gulf of St Lawrence.

No. II. First observed in latitude 44°, longitude 26° 30′ west; last observed in latitude 49°, longitude 9° east; time of transit, 48 hours; velocity per hour, 33 miles Reports from the Pacific coast and the northern stations of the Rocky mountains indicate that this depression had its origin in the north Pacific. It was at no time wholly within the limits of the stations, and its general form was that of an elongated ellipse, or trough extending toward the northeast, immediately in advance of the most extended area of high barometer of the month. The rains which followed were unusually heavy in the Lake region, where the storm became very violent on the morning of the 10th, causing disasters which resulted in serious loss of life. Wrecks were also reported in the Gulf of St. Lawrence, where the wind became unusually strong, after shifting to the north and west.

No. III. First observed latitude 13°, longitude 17° east; last observed latitude 38°, longitude 6° east; co-ordinate of the vertex of path, latitude 28° 30′, longitude 19° 30′ west; mean velocity per hour, 19 miles Although this storm is not traced on the chart further to the eastward than the western portion of Cuba, reports recently received indicate that it originated east of Barbadoes, where a severe tornado occurred on the morning of the 9th. Succeeding reports from the West India stations show great barometric disturbances in that region until the afternoon of the 12th, when the storm had reached the eastern portion of Cuba. On the 13th a violent hurricane occurred at Santiago de Cuba, and the barometer at Key West had fallen to 29.81, with a brisk northeast wind. By midnight the wind had increased to a northeast gale and the barometer had fallen to 29.74. The morning report of the 14th indicated that the centre of disturbance had passed to the westward of Key West and Havana. The succeeding tri-daily reports of the 15th and 16th show a continuous westerly movement of the centre, the progressive velocity being retarded as the storm approached the vertex of its path; from the afternoon of the 15th to the afternoon of the 17th its mean velocity being 8 miles per hour. During the slow progressive movement the velocity of rotation increased to 88 miles per hour, when the cups of the anemometer at Indianola were carried away. Full accounts have already appeared giving details of the loss of life and destruction of property caused by this storm, the most severe which has occurred in the United States since the establishment of the Signal Service. In the meteorological history of the country its parallel occurred between the 27th of September and the 10th of October, 1837. In Chart No. I it will be seen that the northern half of the curve passes directly to the northeast, cutting the coast line near Norfolk. During the easterly movement the centre of depression gradually changed to an elongated ellipse, and the velocity of rotation was materially retarded while the centre remained on the continent. It however left

the Atlantic coast, producing heavy gales and marine disasters on the Jersey coast. Recent reports from the Atlantic, considered in connection with the violent storms which prevailed north of Great Britain from seven to nine days after the storm left our coast, indicate that this depression may have crossed the Atlantic.

The following reports and observations are taken from the monthly journals of the Signal Service:

"Galveston, Septeber 17th.—Storm continues with increased violence; at 2 P. M, barometer reached its minimum, 29.038; maximum velocity of wind, 4:50 P. M., sixty miles, southwest and west.

September 16th,—Observer at Indianola reports: "Rain continued and storm increased to hurricane from northeast, accompanied by a disastrous inundation from he Bay. One hundred and seventy-six lives lost and three-fourths of the town swept away, causing a loss of upwards of one million dollars worth of property, a severance of communication with the outside world, and a total suspension of business. Highest registered velocity of wind 88 miles, estimated velocity 100. The following hourly observations were taken at Indianola on the 15th and 16th:

DATE.	BAROMETER.	THERMOMETER.	DIRECTION.	WIND-VEL.	WEATHER.
15th, 2 p. m	29.60	84	NE	40	Threatening.
3 "	29.73	83	N	36	Threatening.
4 "	29.70	82	N	40	Threatening.
5 "	29.70	76	N	38	Light rain.
6 "	29.68	76	N	41	Light rain.
7 "	29.70	75	N	40	Light rain.
8 "	29.68	75	NNE	48	Light rain.
9 "	29.66	75	NNE	53	Light rain.
10 "	29.63	74	NNE	56	Light rain.
11 "	29.59	74	NNE	58	Light rain.
12 m.	29.56	74	NNE	60	Light rain.
16th, 1 a. m	29.52	74	NNE	56	Light rain.
2 "	29.46	74	NNE	60	Heavy rain.
3 "	29.39	74	N	66	Light rain.
4 "	29.36	74	NNE	68	Heavy rain.
5 "	29.35	74	NNE	64	Heavy rain.
6 "	29.36	74	NE	58	Light rain.
7 "	29.34	75	NE	66	Heavy rain.
8 "	29.33	75	NE	56	Light rain.
9 "	29.31	75	NE	64	Light rain.
10 "	29.29	75	NE	60	Light rain.
11 "	29.22	75	NE	74	Light rain.
12 m.	29.17	75	NE	72	Light rain.
1 p. m.	29.13	75	NE	72	Light rain.
2 "	29.06	75	NE	68	Light rain.
3 "	29.01	75	NE	72	Heavy rain.
4 "	28.95	75	NE	76	Heavy rain.
5 "	28.90	75	NE	82	Heavy rain.

During the continuance of this storm in the Gulf a secondary depression developed in the upper Mississippi valley and passed directly eastward to the Atlantic coast, causing high winds on the Lakes and near the New England coast. This depression was central in Maine on the 17th, and disastrous storms occurred in the Gulf of St. Lawrence and the Gulf of Mexico on that day.

No. IV. Observed in the Northwest on the 17th, and first located in latitude 44°, longitude 14° west; last observed in latitude 45°, longitude 5° east; mean velocity per hour twenty-two and a half miles. This storm was central in Michigan when the cyclone was central in eastern Tennessee, but the two depressions remained distinct, the latter moving with greater velocity, disappearing to the east, while the former was central in the Lower Lake region on the morning of the 20th. Light rains preceded and followed this depression, and strong northwest winds occurred on Lakes Michigan and Erie during the night of the 19th. The occurrence of these secondary depressions in the vicinity of the cyclone greatly reduced the barometric gradient, and will account for the diminished force with which the latter passed over the continent.

No. V. The telegraphic reports of the 22d and 23d indicated that this depression extended to the Pacific coast, and that the track of its centre was to the north of the Lake region, bearing to the northeast towards Hudson's Bay.

No. VI. This is the approximate track of a local barometric disturbance in the Gulf of Mexico, which, though slight, was accompanied by very heavy rain on the coast, and dangerous winds in the Gulf on the 24th and 25th. Six inches of rain are reported at New Orleans and three inches at Mobile on the 25th The depression moved slowly to the east, south of the Gulf coast, on the 26th and 27th, and disappeared apparently under the influence of the high barometer, in the lower Mississippi valley without passing to the east of Florida. Heavy rains continued near the Gul coast and in the southern portion of the South Atlantic States during the 26th and 27th.

No. VII. First observed in latitude 47°, longitude 3[illegible]° west; last observed in latitude 47° 30′, longitude 7° 30′ east; time of transit, sixty-four hours; mean velocity, twenty-five miles per hour. It developed in the extreme Northwest, and moved in a southeasterly direction until it reached the southerly portion of the Upper Lake region on the morning of the 29th, after which its course changed to the northeast, following the general direction of the St. Lawrence valley, being felt as an area of cloud and light rain in the northern portion of the United States, and accompanied by high northerly and westerly winds on Lakes Erie and Michigan, the velocity of which, on the night of the 29th, exceeded thirty miles.

No. VIII. First observed in latitude 39° 30′, longitude 12° west; last observed in latitude 40°, longitude 1° west. This storm is of particular interest, as it developed within the limits of the United States, and moved directly to the east, after a rotary movement of the atmosphere had commenced. On the morning of the 1st of October it was central in eastern Pennsylvania, after which its course changed slightly to the north of east. The rainbelt accompanying this storm extended over the Lake region, southward to Tennessee, and thence eastward to the Atlantic coast.

(3.) *Local Storms.*—On the 1st gales were reported at Wyanet, Illinois, and at Independence, Iowa, many trees being blown down at the latter place. On the 3d a severe thunder-storm occurred twenty miles southwest of Abington, Ill., the lightning striking the house of Robert Meachum, killing four cows and one horse. This is regarded, in the vicinity, as the heaviest storm of the year. On the 5th gales were reported at Corning, Miss., and at Florida, Mass. On the 6th a thunder storm, accompanied by a high wind, passed over Penn Yan, New York. On the 7th and 8th at Belvidere, Illinois; on the 8th and 9th at Beloit, Wisconsin; on the 9th at Chicago and Keokuk; and on the 9th and 10th at Dubuque, heavy and destructive rain-storms were reported, producing overflows in the rivers and streams of the various neighborhoods on the 9th and 10th, and causing much destruction of property along the banks, bridges, &c. The amount of

rainfall during the storm at Beloit, Wisconsin, is reported over six inches, and at Belvidere, Illinois, nearly four inches. On the 10th at 5:30 p. m. at Las Cruces, New Mexico, a waterspout suddenly appeared in the hills one mile back of the town, toward the north, and passed over the town as a tall, dark column of water and dust, destroying buildings, &c., in less than ten minutes. The water in the streets was from four to five feet deep, and two hours later rain commeced and fell in torrents for several hours. One report of this disaster says "It was midnight before the flood abated, and this morning our town, which was yesterday one of the most flourishing in the Southwest, stands a mass of ruins sad to contemplate. It is impossible to estimate the value of property destroyed." On the night of the 9th a tornado spent its fury on Normal, Illinois, where two gales seemed to converge, demolishing a large brick house and severely injuring one person. Other buildings and barns were demolished, and at King's Mill, a few miles west of Bloomington, the storm cut a track through a maple grove, twisting and uprooting the trees. At Clinton one man was killed by lightning, and at La Fayette cars were blown off the track. On the 10th gales were reported at Newport Barracks, Kentucky; Milford, Delaware; Depauville, New York; Weldon, North Carolina; Carthagena, Ohio; West Charlotte, Vermont; on the 11th at Atlanta, Georgia; on the 16th at Atlanta, Georgia, and Carthagena, Ohio; on the 17th at Gardiner, Maine, and Brashear, Louisiana; on the 18th at Florida and Fall River, Massachusetts; on the 25th at Ringgold, Ohio; on the 29th at Carthagena, Ohio; and on the 30th at Florida, Massachusetts. During the night of the 18th and morning of the 19th Charleston, S. C., was visited by a heavy rain and wind storm, doing damage to trees, &c. On the 15th at 5:30 p. m. a heavy rain and hail storm, with high wind, passed over St. Anthony and Minneapolis, Minnesota. On the afternoon of the 21st a severe storm of wind, hail and rain was reported from the southwestern portion of New Mexico, extending from Bear Creek cañon, beyond the upper Mimbres, breaking down the largest trees and carrying them high in the air, the wind denuding the earth of every thing. Hail-stones as large as cups fell and covered the mountains, looking at a distance like snow; some stones are described as weighing over a pound. On the 24th a storm of hail, sleet and snow, was also reported from Santa Fé, N. M. On the 30th a severe wind storm passed near Fort Madison, Iowa, blowing down fences, unroofing houses, &c

TEMPERATURE OF THE AIR.

The distribution of mean temperatures for the month is indicated by the isothermal lines on chart.

No. I. The temperature table on the same chart gives the average for the various districts for the month, together with the average for September during a long series of years. The comparison shows that the weather has been cooler than usual in all the districts, and most particularly so in the St. Lawrence valley. This excess of cold is largely due, in the northern sections, to the areas of unusully high barometric pressure which have crossed the country, and, in the southern, to the prevailing northerly winds induced by the storms in the Gulf. The following are a few of the maximum temperatures of the month: Corsicana, Texas, 100°; Jacksonville, Fla., 98°; Augusta, Ga., Dodge City, Kan., and Montgomery, Ala., 97°; Shreveport, La., and Tybee, Ga., 96°; Indianola and Denison, Texas, and Wilmington, N. C, 95°. The minimum temperatures for the month occurred at the following stations: Mt. Washington, 15°; Pike's Peak, 17°; Pembina, Dak., 21°; Colorado Springs, Col., 27°; Cheyenne, W. T., and Breckenridge, Minn., 28°; Bismarck, Dak., 29°; Marquette, Mich., 30°; Wytheville, Va., and Yankton, Dak., 30°; Escanaba, Mich., North Platte, Neb., and Burlington, Vt. The